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AnS 490-H: Part I; Building a Portable Environmentally Enriched Wagon for a North American Porcupine

A.S. Leaflet R3262

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Summary and Implications

The objective of this project was to design and construct a portable environmentally enriched wagon for a North American Porcupine with the intent for it to be used during educational presentations at the Omaha Henry Doorly Zoo and Aquarium. The wagon design was built using SolidWorks. A nine-step process was developed to build the wagon: (1) cut the boards to proper length and secure with corner braces (2) place border around primary and secondary platforms (3) add casters to primary boards and pegs to secondary board (4) connect U-brackets to board underside for dowels to fit (5) cut and add plastic base to boards (6) place cork tiles on secondary board (7) secure tree trunk and branches to primary board (8) secure hide next to tree (9) add woodchips to primary board. It took approximately 53 hours with two persons to construct the wagon and cost ~\$63. In conclusion, the construction of the portable environmentally enriched wagon was successful. It was cost friendly and completed within the desired time frame.

Introduction

A zoo is where people come to see and become informed about a variety of animal species. During scheduled times zookeepers give educational presentations that cover pertinent subject matter areas, for example training exercise, nutrition, and health. This opportunity allows close interaction between person and animal. However, during these educational presentations, it is important to provide an environment that allows the animal to engage in natural species specific behaviors. Therefore, the objective of this project was to design and construct a portable environmentally enriched wagon for a North American Porcupine with the intent for it to be used during educational presentations at the Omaha Henry Doorly Zoo and Aquarium.

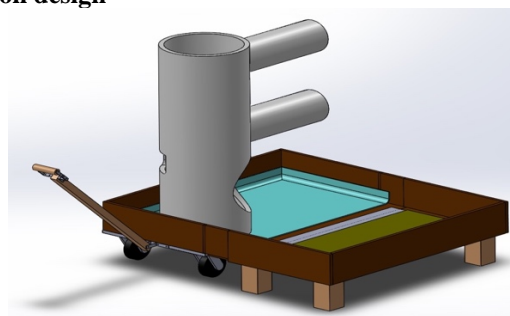
Materials and Methods

The project was approved by Alysia Hess and Omaha Henry Doorly Zoo and Aquarium

Design Phase: The wagon design was created using SolidWorks (Figure 1). Each color represented a different construction item. The dark brown represented plywood for the borders and platform. The base legs, handle, and

handle shaft were light brown and the casters black. Cork tiles were displayed as olive green with the floor mat beside it blue. Finally, the tree trunk and branches were white. The base with the tree trunk was considered the primary platform and the other side the secondary platform.

Figure 1: Proposed portable environmentally enriched wagon design



Supplies: After the wagon design was completed the next step was to identify smaller supplies (Table 1). Most of the supplies were provided by the Omaha Henry Doorly Zoo and Aquarium. Those items were not given a cost amount, hence the total spent was ~\$63.

Table 1: Supplies to construct the portable environmentally enriched wagon

Item	Dimensions (mm)	Amount
Bolt Locks	60	Two
Safety Hasp	100	Two
Wood Screws	200 x 20	One Box
Deck Screw	60	One Package
Extra Hasp Loop	40 x 30	Two
Corner Brace	50 x 20	Forty
Hex Bolt 5pc	6 x 60	One Package
Poplar Dowel	40 x 1200	One
U-Brackets	150 diameter	Six
Insert Locknut	6	One Box
Fender Washer	6	One Box
Carpet Tacks	283.50-gram box	Four Boxes
Plastic Pot	320 x 320 x 320	One

Construction: A nine-step process built the wagon: (1) cut the boards to proper length and secure with corner braces (2) place border around primary and secondary platforms (3) add casters to primary boards and pegs to secondary board (4) connect U-brackets to board underside for dowels to fit (5) cut and add plastic base to boards (6) place cork tiles on secondary board (7) secure tree trunk and branches to primary board (8) secure hide next to tree (9) add woodchips to primary board (Figures 2 and 3).



Figure 2: After step (2) **Figure 3:** After step (4)

Environmental Enrichment Aspects: The portable environmentally enriched wagon was designed to meet the five enrichment categories. Although only one item is listed, an item could be cross-listed over several enrichment categories (Table 2).

Table 2: Items on the portable environmentally enriched wagon and their relevance to environmental categories

Item/Details	Enrichment Category	Biological Relevance
Primary platform		
Tree trunk	Occupational: climbing promotes exercise	Climbing and eating
Tree branches	Nutritional: hide food on branch, as well as on wagon	Climbing and foraging
Woodchips	Physical: substrate that the animals are familiar with	Comfort
Secondary platform		
Training	Social: Give direct contact to keeper whilst still being visible to public	Human interaction
Cork tiles	Physical: change in substrate that is new to animal	New, softer flooring

Note: Sensory enrichment may not have been listed in any of these items, but that was accomplished during the educational presentations by a food reward given by the trainer to the animal. In addition, it is predicted that during these educational presentations, there will be new sights (people) and sounds (people).

Results and Discussion

Construction: It took approximately 53 hours with two persons to construct the wagon (Figure 4). There were alterations made during the construction process that made the final wagon look different from the SolidWorks portable environmentally enriched wagon (Figure 1). The original design had the hide within the tree to give ground space, while the final design had a hide that was separate from the tree. This gave Clover the opportunity to seek shelter if she felt uncomfortable. Originally, PVC was going to be used to mimic the tree, but a natural tree trunk was used in its place. Instead of two straight branches, one branch connecting the tree to the hide was constructed because the horizontal branches were not stable. The secondary platform was built, but it was determined to be too large for transportation to the public arena and was discarded.

Figure 4: Completed portable environmentally enriched wagon



In conclusion, the construction of the portable environmentally enriched wagon was successful. It was cost friendly and completed within the desired time frame.

Acknowledgements: Ms. Heather Biszak, the lead keeper, approved the portable environmentally enriched wagon and obtained most of the materials needed for construction. Mr. Patrick Keep helped construct the portable environmentally enriched wagon. The Wild Kingdom Pavilion keepers provided flexibility during the wagon construction, allowing Miss. Deal to work on the portable environmentally enriched wagon instead of performing other job responsibilities.